

REMARKS

Reconsideration and allowance of this application are respectfully requested in light of the following remarks.

Claims 1, 2, 4-6, and 8 have been amended, and claims 9-12 have been newly added. Support for the amendments is provided for example in Applicants' Figs. 4 and 5 and paragraphs [0066] and [0067] of Applicants' published specification. (It should be noted that references herein to the specification and drawings are for illustrative purposes only, and are not intended to limit the scope of the invention to the preferred embodiments).

Claims 2, 3, and 5 stand withdrawn from consideration as being directed toward non-elected subject matter.

Claims 1, 4, 6, and 8 were rejected, under 35 USC §103(a), as being unpatentable over Daoud (US 4,835,791) in view of Muzzi (US 3,628,155). To the extent that these rejections may be deemed applicable to the amended claims, the Applicants respectfully traverse based on the points set forth below.

Claim 1 defines:

A modulation apparatus comprising:
a first frequency-increasing single side band (SSB) modulator that performs SSB modulation on a first input symbol to obtain an upper side band (USB) signal;
a second frequency-increasing SSB modulator that performs the SSB modulation on a second input symbol to obtain a lower side band (LSB) signal; and
a combiner that combines the USB signal and the LSB signal,
wherein the second frequency-increasing SSB modulator performs SSB modulation to obtain the LSB signal using a carrier frequency, the carrier frequency being higher than a carrier frequency used in the first frequency-increasing SSB modulator by a symbol frequency of the first input symbol and the second input symbol, such that the LSB signal and the USB signal are multiplexed in the same frequency band.

Thus, claim 1 provides a modulation apparatus that performs single side band (SSB) modulation to obtain a lower side band (LSB) signal using a carrier frequency that is higher, by the symbol frequency of first and second input symbols, than a carrier frequency that is used to obtain an upper side band (USB) signal, such that the LSB signal and USB signal are multiplexed in the same frequency band. Independent claim 4 similarly recites this subject matter, but with respect to a method counterpart of claim 1.

The Examiner's Interview Summary dated January 14, 2011, states that the meaning of Applicants' previously recited limitation of a "fundamental frequency" was unclear (see Office's Interview Summary comments, last paragraph).

In response, the Applicants have amended the claim language to refer to a "symbol frequency."

Thus, Applicants' claims 1 and 4 now recite that the difference in carrier frequencies used to generate LSB and USB signals is given by the symbol frequency of first and second input symbols.

On the other hand, Daoud discloses a difference of 200 Hz between carrier frequencies used to generate LSB and USB signals (see Daoud col. 4, lines 38-49), as is acknowledged in the Examiner's Interview Summary (see Examiner's Interview Summary comments, second to last paragraph). Daoud's disclosed difference of 200 Hz between carrier frequencies used to generate the LSB and USB signals is not the symbol frequency of the input signal to the LSB and USB modulators.

Muzzi does not supplement the teachings of Daoud in this regard.

New claims 9 and 11 recite that the symbol frequency recited in claims 1 and 4 is the bandwidth of the first and second input symbols.

Daoud discloses that the bandwidth of the input symbols modulated onto the LSB and USB signals is either 1600 Hz or 3200 Hz (see Daoud col. 1, lines 26-29, and col. 3, lines 4-9), but the difference between carrier frequencies used to generate the LSB and USB signals is 200 Hz (see col. 4, lines 38-49).

Thus, Applicants' claims 9 and 11 recite that the difference in carrier frequencies used to generate LSB and USB signals is given by the bandwidth of first and second input symbols, whereas Daoud discloses a difference in carrier frequencies of 200 Hz, which is not equivalent to the 1600/3200 Hz bandwidth of input symbol S1 and S2 that are modulated onto Daoud's LSB and USB signals. And Muzzi does not supplement the teachings of Daoud in this regard.

New claims 10 and 12 recite that the frequency band into which the LSB and USB signals, of claims 9 and 11, are both multiplexed has the same bandwidth as each of the first and second input symbols.

Daoud discloses that the frequency bands into which LSB and USB signals are multiplexed do not overlap and the two bands have a combined bandwidth of at least twice the bandwidth of the input signals to the single-sideband modulators (see Daoud col. 4, lines 38-49, and Applicants' Fig. 2 and its accompanying description in the specification for a detailed explanation as to why the LSB and USB signals each have the same bandwidth as the input signal).

Thus, claims 10 and 12 recite that the frequency band into which LSB and USB signals are both multiplexed has the same bandwidth as each of the first and second input symbols,

whereas Daoud discloses that the frequency bands into which LSB and USB signals are multiplexed do not overlap and the two bands have a combined bandwidth of at least twice the bandwidth of the input signals to the single-sideband modulators.

Muzzi does not supplement the teachings of Daoud in this regard.

Accordingly, the Applicants submit that the teachings of Daoud and Muzzi, even if combined as proposed in the Examiner's Interview Summary and Final Rejection, still would lack the above-noted subject matter of claims 1, 4, and 9-12 and thus these references, considered individually or in combination, do not render obvious the subject matter now defined by claims 1, 4, and 9-12. Therefore, allowance of claims 1, 4, and 9-12 and all claims dependent therefrom is warranted.

Moreover, claims 1 and 4 recite using a higher carrier frequency to generate an LSB signal than that used to generate a USB signal, whereas Daoud discloses using a higher carrier frequency to generate a USB signal than that used to generate an LSB signal, as is acknowledged in the Office's Interview Summary (see Office's Interview Summary comments, third paragraph). To overcome this deficiency, the Examiner's Interview Summary proposes that a skilled artisan would find it obvious to modify Daoud's system so that a higher carrier frequency was used to generate the LSB signal than that used to generate the USB signal (see comments, fourth paragraph).

However, the Office's proposed modification of Daoud's system would shift the generated LSB and USB signals in opposite directions along the frequency spectrum such that interference would be created for the lower baseband frequencies within the modulated and multiplexed LSB and USB signals. Daoud discloses that an object of his invention is to locate

the lower, more important, frequencies of the baseband signal so as to minimize their degradation (see Daoud col. 1, lines 34-38, and col. 2, lines 37-41).

And to the extent, within the proposed modification of Daoud's system, the difference in carrier frequencies for generating the LSB and USB signals is increased to the extent that no overlap exists in the lower baseband frequencies, such modification would shift the generated LSB and USB signals such that the lower frequencies of Daoud's baseband input signal would be relocated toward the outer edges of the communication channel for the modulated and multiplexed LSB and USB signals. Daoud discloses that an object of his invention is to locate the lower, more important, frequencies of the baseband signal near the center of the communication channel where no, or minimal, channel degradation exists (see Daoud col. 1, lines 34-38, and col. 2, lines 37-41).

Accordingly, the modification of Daoud's system proposed in the Office's Interview Summary renders Daoud's system unsatisfactory for its intended purpose. As stated in the MPEP, if a proposed modification would render a prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the modification (see MPEP §2143.01 fifth bolded heading, first sentence; see also *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)). Therefore, withdrawal of the applied rejections and allowance of claims 1 and 4 and all claims dependent therefrom is warranted for this independent reason.

In view of the above, it is submitted that this application is in condition for allowance, and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

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